

Report for 2001AZ961B: Develop Bioassay Capability for Modification of Water Quality Criteria & Effluent Testing Using Arid West Aquatic Species

There are no reported publications resulting from this project.

Report Follows:

Following is an interim report on progress in the project: Develop Arid West Bioassay Capability for Modification of Water Quality Criteria & Effluent Testing, Award # 01HQGR0113: Project # AZ 961.

Crustacean culture: We have been successful in establishing and maintaining cultures of an ostracod found in samples of soil from Mirror Lake, California. Previously these small crustaceans were identified as clam shrimp (conchostracans), but were recently found to be seed shrimp (Ostracoda). This does not affect the conceptual foundation of the project.

Cultures have been established in approximately 15-l containers of distilled water and Tucson municipal water with a 2-cm layer of playa soil. The cultures essentially become simple, self-regulated microcosms. Initially, a blue-green algae (probably *Microcystis*) begins to grow, especially around the edges of the soil layer. A diatom bloom eventually develops as well; this is almost exclusively a species of *Amphora*. The cultures develop and prosper without supplemental feeding.

We used ten replicates at three temperatures each in 150-ml flasks to assess the effect on development of the cultures. Temperatures were 23, 28, and 33 °C, maintained by water baths equipped with thermoregulators.. By the fourth day ostracod larvae began to emerge. By day ten 48 ostracods had hatched and developed into adults. Of these, 9 were in the high-temperature group, 17 in the low-temperature group, and 22 were in the middle temperature groups. This is a favorable response with respect to the warm watercourse temperatures of the arid West we must represent in the bioassays.

Crustacean bioassays: Early tests were conducted with few replicates (four or eight) to determine generally what concentrations of copper would produce mortality. As we narrowed in on the LC50, more replicates were used (up to 20). Final results indicate that our Ostracod species has a 24-hour copper LC50 of 0.11 mg/l, at a medium water hardness concentration of 75-80 mg/l as CaCO₃. Varying water hardness concentrations had little effect on survival, with preliminary tests showing essentially identical survival at hardness concentrations between 0 and 300 mg/l as CaCO₃.

Native Arid West fish culture: We have established aquaria for culturing fish for the bioassay tests, however, the candidate fish we were culturing was later determined to be non-native, so we are searching for a supplier of another species.

Work planned for the future: Non-native fish will be cultured in waters of varying hardness concentrations as a preliminary step in exposing them to varying concentrations of copper. Similar studies will be conducted on the standard EPA fish species, fathead minnow, to determine relative sensitivity. The relationship between hardness concentration and sensitivity, e.g., the copper LC₅₀ will be compared to the equations EPA has developed for use in waters with lower hardness concentrations.

If resources are still available when the fish bioassays are completed we will complete the bioassay work begun on the crustacean species.